

# On "Fiscal Volatility Shocks and Economic Activity" by Fernandez-Villaverde, Guerron-Quintana, Kuester, and Rubio-Ramirez

Julia K. Thomas

September 2014

# Overview

How does time-varying uncertainty about fiscal policy affect aggregate fluctuations?

- Novel estimation of fiscal volatility shocks
- New Keynesian model solved using 3rd-order local approximation to study their effects
- Result: fiscal volatility shocks generate recessions through sharp rises in markups (notably at zero lower bound)
- Result: monetary policy can be effective in responding to fiscal volatility shocks

# Stochastic volatility model to measure fiscal uncertainty

- Fiscal policy rules with 'innovations'  $\varepsilon_{x,t}$

$$x_t - x =$$

$$\rho_x(x_{t-1} - x) + \phi_{x,y}\tilde{y}_{t-1} + \phi_{x,b}\left(\frac{b_{t-1}}{y_{t-1}} - \frac{b}{y}\right) + \exp(\sigma_{x,t})\varepsilon_{x,t} \quad (1)$$

- Fiscal volatility shock:  $\sigma_{x,t}$  realized **this** period

$$\sigma_{x,t} = (1 - \rho_{\sigma_x})\sigma_x + \rho_{\sigma_x}\sigma_{x,t-1} + (1 - \rho_{\sigma_x}^2)^{\frac{1}{2}}\eta_x u_{x,t} \quad (2)$$

- Innovation to fiscal volatility:  $u_{x,t}$
- Bayesian estimation; Markov Chain Monte Carlo sampling from posterior; particle filter (nonlinear interaction between  $\sigma_{x,t}$  and  $\varepsilon_{x,t}$ )

# Economic Policy Uncertainty index

Baker, Bloom and Davis (2013) measure

- ① frequency of (uncertainty & economy & policy) in the media
  - ② revenue-weighted measure of tax code provisions expiring in future
  - ③ SPF forecaster disagreement on government spending
  - ④ SPF forecaster disagreement on future inflation
- Components observable at high frequency
  - Agnostic about policy rules (source of uncertainty)

# Policy volatility/uncertainty measures compared

## Capital Tax

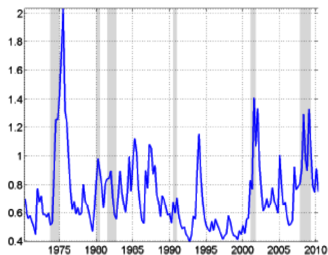
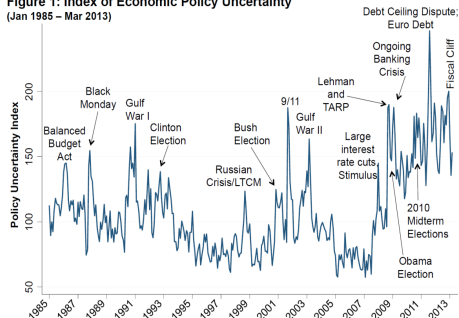


Figure 1: Index of Economic Policy Uncertainty  
(Jan 1985 – Mar 2013)



- both time-varying and countercyclical
- high volatility/uncertainty over 2007-10
- correlation over 1985-2010: 0.35 (over 1995-2010: 0.56)

# Responses to a large fiscal volatility shock

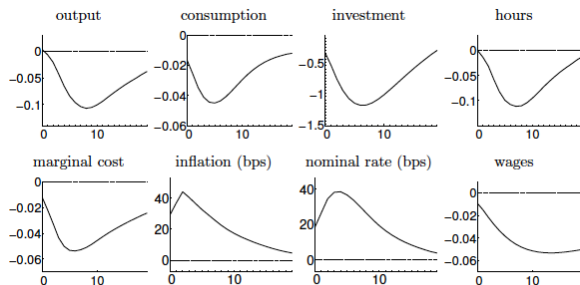


Figure 2: IRFs to a fiscal volatility shock

- Usual NK co-movement between marginal cost and inflation absent
- Like a markup shock. But different monetary policy implications!
  - Markup shock: Aggressive inflation response deepens recession
  - Fiscal volatility shock: No such tradeoff.

# Responses under a more aggressive Taylor rule

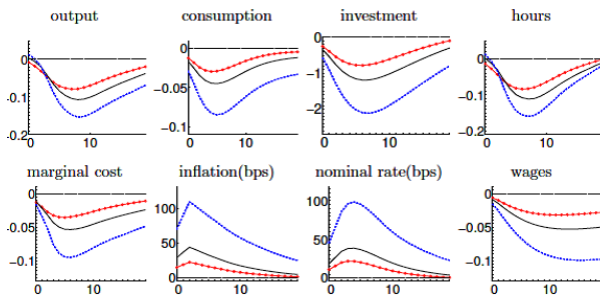


Figure 12: Fiscal volatility shocks – effect of Taylor rule

- Black line: Baseline Taylor rule ( $\gamma_{\Pi} = 1.25, \gamma_y = 0.25$ )
- Red line: Taylor rule weighting inflation more heavily ( $\gamma_{\Pi} = 1.50$ )
- Sharp policy prescription, if the monetary authority can identify fiscal volatility shocks in real time.

# Mechanics following a fiscal volatility shock

Volatility shock increasing dispersion of  $\tau_{k_{t+1}}$  sets off two channels.

1. **Aggregate demand channel:** Households fear high tax realizations.

reduced certainty-equivalent income induces strong precautionary effects on consumption, savings and hours

⇒ drives down wages, marginal costs and aggregate demand

2. **Upward pricing bias channel:** Firms fear low tax realizations.

firms asymmetrically avoid low relative price (concave profit function)

respond to high demand risk by raising prices (micro- price rigidity)

⇒ recession compounded by inflation (low real wages, interest rates)



# Implications of fiscal volatility shock mechanics

## 1. A more aggressive Taylor rule helps stabilize output.

firms more confident about future price level; less relative price risk

⇒ reduces upward pricing bias, so less inflation and softer recession

## 2. Zero lower bound exacerbates recession

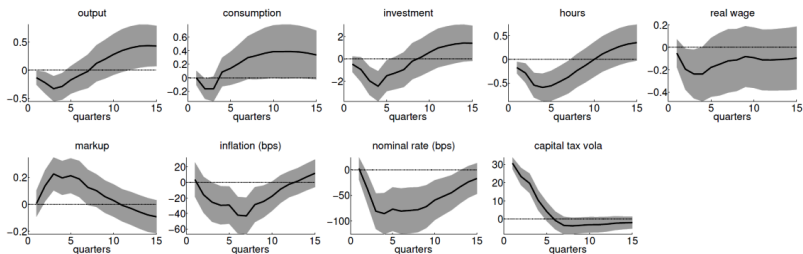
aggregate demand more responsive to fiscal shocks when monetary policy cannot lean against them

firms more nervous about future price level; more relative price risk

⇒ amplifies upward pricing bias channel

# Empirical responses to a fiscal volatility shock

Figure 8: IRFs to a 2-std.-deviation capital income tax volatility shock



- agreement elsewhere, but inflation and nominal rates **rise** in the model
- reconciled if monetary authority places weight on fiscal volatility

# What if the monetary authority responds to fiscal volatility?

Perhaps the true rule includes  $\left(\frac{\sigma_{x,t}}{\sigma_x}\right)^{(1-\phi_R)\gamma_{\sigma_x}}$  with small  $\gamma_{\sigma_x}$ .

- Will 'no output-inflation tradeoff' policy implication survive?  
maybe, if upward pricing bias channel stays fairly strong
- A blow for existing work using Taylor rules with  $\gamma_{\sigma_x} = 0$ ?  
unlikely given the estimated frequency of large volatility shocks  
and the rarity (pre-2007) of zero lower bound events.

Perhaps the true rule is regime-switching; high  $\gamma_{\Pi}$  in volatile times.

# Model fit with respect to business cycles

Table 5: Second Moments in the Model and the Data

	Model			Data		
	std	AR(1)	Cor(x,y)	std	AR(1)	Cor(x,y)
<u>Output, consumption and investment</u>						
$y_t$	1.59	0.62	1	1.57	0.87	1
$c_t$	1.27	0.68	0.54	1.28	0.89	0.87
$i_t$	6.42	0.95	0.25	7.69	0.83	0.91
<u>Wages, labor and capacity utilization</u>						
$w_t$	0.17	0.95	0.53	0.88	0.76	0.10
$h_t$	1.74	0.55	0.96	1.93	0.92	0.87
$u_t$	1.61	0.69	0.84	3.24	0.87	0.86
<u>Nominal variables</u>						
$R_t$	2.92	0.83	0.05	3.67	0.93	0.18
$\Pi_t$	3.26	0.63	0.37	2.47	0.98	-0.004

- worrisome investment-output correlation (0.25 versus 0.91)
- high real wage (price) stickiness (avg duration 1 year)
- high elasticity of substitution across goods ( $\epsilon = 21$ )
  - critical in volatility shock recessions (Born and Pfeifer, JME 2014)

# Two-sided versus one-sided risk

- Policy risk is probably of a more one-sided nature (e.g., since 2007)
- Fernandez-Villaverde, Guerron-Quintana and Rubio-Ramirez are adapting their existing methods to handle one-sided risk
- Current model unlikely to benefit from this; absent the risk of low taxes, upward pricing bias channel should disappear

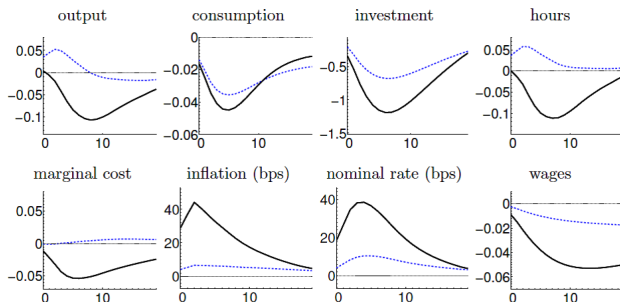
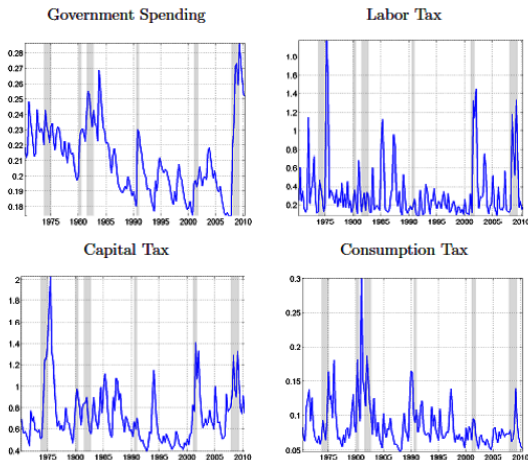


Figure 5: The role of precautionary price setting

# What causes countercyclical policy risk?

- Fiscal policy shocks don't cause (most) business cycles, yet:



- Policymakers systematically making business cycles worse? Why?